

Notice of Allowability

Application No.

10/709,906

Examiner

Thanhha Pham

Applicant(s)

KWON ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/24/04 and interview dated 12/20/04.
2. ☒ The allowed claim(s) is/are 1-19.
3. ☒ The drawings filed on 04 June 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 06/04/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Daniel Schnurmann on 12/20/04.

The application has been amended as follows:

- Specification paragraph [0035], line 1, change "FIG. 1C" to – FIG. 1C' –
- In claim 1,
 - Line 9, change "the hard mask" to – the first hard mask layer –
 - Line 13, change "the hard mask layer" to – the first hard mask layer --
 - line 17, change "the device" to – the first hard mask layer –
 - line 21, before "first" insert – the –
 - line 22, before "first" insert – the –
- In claim 2,
 - Line 2, change "the hard mask" to – the first hard mask layer –
- In claim 5,
 - Line 2, change "the hard mask" to – the first hard mask layer --
- In claim 11,
 - line 9, change "the hard mask" to – the first hard mask –
 - line 14, change "liner" to – line --

line 20, delete "first"

line 21, change "device" to -- HM1 layer --

line 26, change "second dielectric" to -- ILD2--

- Cancel claim 20.

Allowable Subject Matter

1. Claims 1-19 are allowed.
2. The following is an examiner's statement of reasons for allowance: Recorded Prior Art fails to disclose or suggest the combination of the process steps of forming a device including a conductor and a contact over a semiconductor substrate as recited in the base claim 1 including: widening the conductor line slot in the first hard mask layer to form a widened conductor line slot; forming a capping layer in the widened conductor line slot covering the conductor; depositing a second dielectric layer over the first hard mask layer; etching an initial contact hole through the second dielectric layer down to the top surface of the first hard mask layer and etching a deep contact hole through the first hard mask layer and the first dielectric layer down to the substrate with an etchant selective to the capping layer. Recorded Prior Art fails to disclose or suggest the combination of the process steps of forming a device including a conductor and a self-aligned contact over a semiconductor substrate as recited in the base claim 11 including: widening the conductor line slot in the hard mask layer to form a widened conductor line slot over the ILD1 layer; forming a capping layer composed of silicon nitride in the widened conductor line slot covering the conductor and overhanging the

ILD1 layer; depositing a second interlayer dielectric (ILD2) layer over the HM1 layer; forming a second hard mask (HM2) layer over the ILD2 layer; forming a photoresist mask over the HM2 layer; etching an initial contact hole through the photoresist mask, the HM2 and the ILD2 layer down to the top surface of the HM1 layer and etching a deep contact hole through the HM1 layer and the ILD1 layer down to the substrate with an etchant selective to the capping layer.

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

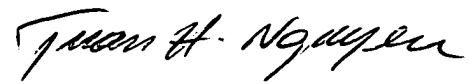
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thanhha Pham

A handwritten signature in black ink, appearing to read "Tuan H. Nguyen". The signature is fluid and cursive, with the first name "Tuan" and last name "Nguyen" clearly distinguishable.

Tuan H. Nguyen
Primary Examiner